

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the following remarks.

The Official Action sets forth an anticipatory rejection of Claims 1-12 based on the disclosure contained in U.S. Patent No. 5,029,494 to *Lentz et al.*

Lentz et al. discloses an automatic transmission control method for controlling a clutch-to-clutch powered down shift involving disengaging one clutch (off-going clutch) while engaging another clutch (on-coming clutch) in a controlled manner using transmission speed feedback. The disclosure in *Lentz et al.* is particularly concerned with achieving what is termed high quality powered down shifts in which the off-going pressure command is determined using a closed-loop control signal.

The control apparatus of the present invention controls the torque phase of an up-shifting operation in an automatic transmission. In the control apparatus at issue here, an integral-proportional feedback control is initiated to substantially match the calculated slip amount with the calculated target slip amount to restrain over rotation of the turbine runner or the input shaft due to up-shifting operation during a torque phase when the calculated slip amount is judged to exceed the predetermined threshold value. Generally speaking, in an automatic transmission shift change, the turbine rotation of the torque converter is controlled such that the tendency of rotation is generally maintained as possible to achieve less shift-shock during the torque phase, and such that the decline gradient of the rotation is controlled for synchronization with the higher gear ratio of the automatic transmission during the inertia phase. During the torque phase, over rotation of the turbine is likely to occur due to the time lag associated with the timing for the reduction of the oil pressure

supplied to the off-going friction engagement element. Thus, as illustrated by way of example with reference to the disclosed embodiment of the control apparatus, the control apparatus begins to perform the integral-proportional feedback control (step 300 in Fig. 13 and 2 in the graph of Fig. 3) to substantially match the calculated slip amount with the calculated target slip amount to restrain over rotation of the turbine runner 21b or the input shaft 31 due to up-shifting operation when the judging means judges that the calculated slip amount exceeds the predetermined threshold value (step 202 of Fig. 13). The target slip amount varies from the predetermined threshold value (r_1 in the graph of Fig. 3) to a predetermined target value (r_2 in the graph of Fig. 3) to obtain an ideal trace for restraining the shift shock of the torque phase of the up-shifting operation. The control apparatus can thus restrain the over rotation of the turbine runner or the input shaft which would otherwise cause shift shock during the torque phase of the up-shifting operation (the range t_2 to t_3 in the graph of Fig. 3).

Independent Claims 1 and 2 have been amended to recite that the control apparatus controls the torque phase of the up-shifting operation, to recite that the target slip amount varies from the predetermined threshold value to the predetermined target value to draw an ideal trace for restraining shift shock of the torque phase of the up-shifting operation, and to recite that the disengaging side controlling means begins to perform the integral-proportional feedback control to substantially match the calculated slip amount with the calculated target slip amount for restraining over rotation of the turbine runner due to the up-shifting operation.

As noted above, *Lentz et al.* is specifically concerned with achieving high quality powered downshifts and is not at all concerned with controlling the torque

phase of an up-shifting operation. *Lentz et al.* also does not disclose and is not concerned with restraining over rotation of the turbine runner due to an up-shifting operation to restrain a shift shock of the torque phase of the up-shifting operation as recited in independent Claims 1 and 2. It is thus respectfully submitted that the claims at issue in this application are patentably distinguishable over the disclosure contained in *Lentz et al.*

The Official Action also sets forth a rejection of all claims based on the disclosure contained in European Application Publication No. 0 656 383 to *Fujita et al.* in view of the disclosure contained in *Lentz et al.* As discussed in the response filed on December 22, 2004, *Fujita et al.* discloses a speed change control method and automotive automatic transmission utilizing feedback control in connection with the turbine rotational speed N_p . This feedback control involves obtaining the turbine rotational speed changing rate $(N_t)'$ and the output shaft rotational speed changing rate $(N_o)'$. An actual slip rotational speed changing rate $(N_s)'$ is then determined by subtracting the product of the output shaft rotational speed changing rate and the gear ratio K_2 from the turbine rotational speed changing rate. Thereafter, the controller reads an initial duty factor Da_0 for a second-speed solenoid valve 11', and reads a target slip rotational speed changing rate $(N_i)'$.

Thus, the disclosure in *Fujita et al.* is thus specifically concerned with reducing speed change shock by feedback-controlling the slip rotational speed of a connection side clutch. Stated differently, *Fujita et al.* is specifically concerned with reducing shift shock during the inertia phase. As illustrated in step 76 of Fig. 5 of *Fujita et al.*, the feedback control is conducted in connection with synchronization between the output shaft rotation N_o and the turbine rotation speed N_t . Step S71 in

Fig. 5 of *Fujita et al.* pertains to the torque phase, but here the controller merely releases the engagement of the first speed clutch corresponding to the off-going friction engagement element as discussed in lines 9-31 of column 8 and in column 9, line 31 – column 11, line 27. Thus, *Fujita et al.* is not concerned with restraining shift shock of the torque phase of an up-shifting operation and restraining over rotation of the turbine runner or input shaft due to an up-shifting operation. In addition, as noted above, *Lentz et al.* is specifically concerned with achieving high quality powered down shifts and does not disclose starting performance of an integral-proportional feedback control for restraining over rotation of the turbine runner or input shaft due to an up-shifting operation. It is thus respectfully submitted that a combination of the disclosures contained in *Fujita et al.* and *Lentz et al.* would not have directed one to do that which is defined in independent Claims 1 and 2 as the invention.

Finally, with respect to the obviousness-type double patenting rejection based on claims in U.S. Patent No. 6,480,777, submitted with this Amendment is a Terminal Disclaimer. The filing of this Terminal Disclaimer should not be construed as an indication of agreement with the observations in the Official Action concerning the claimed invention in this application relative to the claims in applicants' earlier patent. The Terminal Disclaimer is being filed to advance prosecution of this application. Accordingly, withdrawal of the obviousness-type double patenting rejection is respectfully requested.

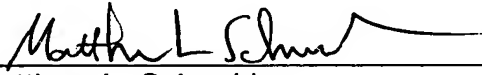
Early and favorable action with respect to this application is earnestly solicited.

Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

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